this is about five seconds in the case of brass and fifteen seconds in the case of copper. From B to C the current reverses and changes the sign which is probably due to decomposition of solvated CuCl complex in presence of oxygen with the simultaneous formation of Cu_2O. Such formation of Cu_2O in chloride solution on copper specimen has also been reported by Bonora *et al* (1970). From C to D or C to D to E the current levels off.

Photo-solvation and decomposition of solvated CuCl complex may be represented as follows :

$$CuCl + nH_2O \xrightarrow{h\nu} CuCl(H_2O)_n, \quad \text{(Solvated)}$$

$$2\text{-}CuCl(H_2O)_n \text{ (Solvated)} + O_2 \xrightarrow{h\nu} Cu_2O + 2HCl + \text{other products}$$

The magnitude of photo-current agrees well with the work on photoelectrolysis of water studied by Kemissarov *et al* (1968) In both copper and brass the photocurrent levels off within three minutes.

Now CuCl is an n-type semiconductor while Cu_2O is a p-type semiconductor Presumabley after usual incubation period, due to photochemical reactions the film transforms itself into a stable Cu_2O photo-voltatic cell, which naturally exhibits a steady current under constant intensity of illumination

References

Bonora P. L , Bolognesi G. P., Borea P. A , Zucchini G. L & Brunoro G. 1970 *3rd European Symposium on Corrosion Inhibitors, Ferrara, Italy* p 688

Champion F. A 1952 *Corrosion Testing Procedures*, Champan and Hall, London p. 187

Kemissarov G. G. & Shumov Yu. S. 1968 *Dokl Akad. Nauk SSSR* **182**(5), 1226

Korovin Yu M. & Ulanovskii I. B. 1971 *Zasheh Metal* **7**, 312.

Nicholas J. E. & Narrish R. G. W. 1968 *Proc Roy. Soc.* **307** (1491) 391.

Shigemitsu N. & Yozo K. 1968 *J. Phys. Soc. Japan* **25**, 1330.

Indian J. Phys. **47**, 573–575, (1973)

Crystallite orientation in munj fibre

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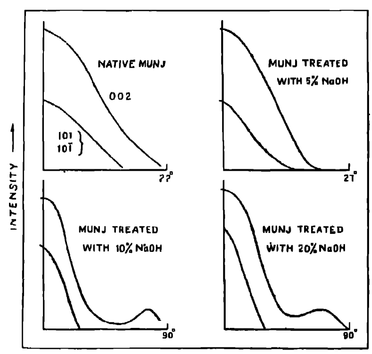
The problem of crystallite orientation in fibres is not only of theoretical interest but also of practical importance as many of their physical and chemical properties are correlated with it. Hermans *et al* (1946) have done extensive work on the technique of measuring orientation both in cellulose I (native cotton, ramie) and cellulose II (regenerated as well as mercerized) fibres. The relation between orientation and physical properties for cotton has been studied by many workers Sen & Wood (1949) studied the orientations for jute and ramie. They compared Hermans' orientation factor and half maximum intensity angle for jute and ramie. They also observed a difference in orientation factors for different varieties of jute. Later on Gupta (1957) noticed the changes in x-ray orientation factor when jute fibre was treated with caustic soda solution of different strengths and washed and dried under different conditions

In the present communication we have determined the x-ray orientation factor for munj, a local cellulose fibre, under various conditions and compared it with the established values of jute and ramie.

Following Hermans, the orientation factor is determined by the equation

$$f_x = 1-3/2\left[\overline{\sin^2\beta_1}+\overline{\sin^2\beta_2}\right] \tag{1}$$

where β_1 and β_2 are the angular distances along the equator for two paratropic interferences arising from planes approximately at right angles to each other In taking averages along the arcs we assign weights $G(\beta)\cos\beta_1$ and $G(\beta)\cos\beta_2$ to the values of β according to the shape of the intensity distribution $I = G(\beta)$.



However, since in those cases where (10$\bar{1}$), (021) overlap, the intensity curve for (10$\bar{1}$) alone cannot be determined, so the following formula is used instead of (1)

$$f_x = 1.245-1.72\,\overline{\sin^2\beta}-2.06\sin^2 t$$

where t is the angle along the (101)-(021) circle relating to the total intensity of two overlapping interferences

Samples of alkali treated fibres were prepared by treating munj fibre with different strengths of NaOH solution X-ray diffraction photographs were taken for all samples with filtered CuK_α radiation from a tube running at 40 KV, 20 mA with a specimen to film distance of 5 cm. The specimen size, exposure time, and photographic technique were standardized as far as possible. The photometer used was Moll's recording type. The film was cut into a circular disc of 4.5 cm. diameter, and was mounted on a rotatable holder fixed to the stage of the microphotometer so that the rotation, which could be made in steps of two degrees of arc, took place about the centre of the photograph At each setting the film was scanned radially by traversing the holder Since the films were of low photographic density, it was assumed in calculations that the X-ray intensity was proportional to blackening and was thus linearly related to the logarithm of the intensity of transmitted light.

In table 1 are given the values of f_x, the Hermans' orientation factor, for munj fibre in native state as well as subjected to different concentrations of NaOH at room temperature. The results obtained show that the orientation factor f_x

Table 1

	Sample	Hermans' orientation factor, f_x
(a)	Native Munj	0 93
(b)	Munj treated with 5% NaOH	0.93
(c)	Munj treated with 10% NaOH	0.91
(d)	Munj treated with 20% NaOH	0 88

does not change substantially till treatment with 10% NaOH. For munj treated with 20% NaOH, we see that the value obtained differs considerably from the former ones

The orientation factor f_x for native munj is found to be 0.93, whereas for jute fibre (singhai variety) it is 0.96 as determined by Gupta (1957). In the case of ramie, the values reported for this orientation factor are 0 97 for native form (Hermans 1946) and 0.89 for mercerized form (Venkatakrishnan 1969)

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References

Gupta V. D. 1957 *J. Polymer Sci.* **26**, 110.
Hermans J. J., Hermans P. H., Vermaas & Weidinger 1946 *Rec. Trav Chim.* **65**, 427.
Hermans P. H. 1946 *Contribution to the Physics of Cellulose Fibres*, Amsterdam.
Sen M K. & Woods H. J. 1949 *Proc. Leeds Phil. Soc* **5**(II), 155.
Venkatakrishnan V. 1969 *J. Appl. Cryst.* **2**, 172.